

ORGANIZATIONAL MODEL OF DIGITALIZATION OF HEALTHCARE IN LEBANON: PRINCIPLES OF CONSTRUCTION AND MAIN ELEMENTS

Taking into account the world experience in construction and implementation of healthcare models and digitizing healthcare services, and at the same time understanding the specifics of the healthcare system in Lebanon, any innovative model should allow to improve the healthcare system processes to be more efficient and transparent [1, 2].

The conceptual approach to the innovative development of healthcare in Lebanon in the context of digitalization of the economy, and the results of a multi-stage analysis carried out by the researcher, made it possible to formulate the following principles for constructing an organizational model of digitalization of healthcare in Lebanon: purposefulness, inclusiveness, progressiveness, integration of medical information, continuity, adequacy, analytical. Based on these principles, the general configuration of the organizational model of digitalization of healthcare in Lebanon was determined, the main elements of which are: 1) the institutional structure of healthcare; 2) eHealth framework design; 3) the fundamental diagram of the formation and functioning of a national unified health information database based on the use of electronic medical records of patients; 4) the roadmap for digitalization of healthcare.

The proposed model is based on the existing institutional structure of Lebanese healthcare, and groups the related parties according to their efforts. According to their institutional role, stakeholders can be grouped into three parts.

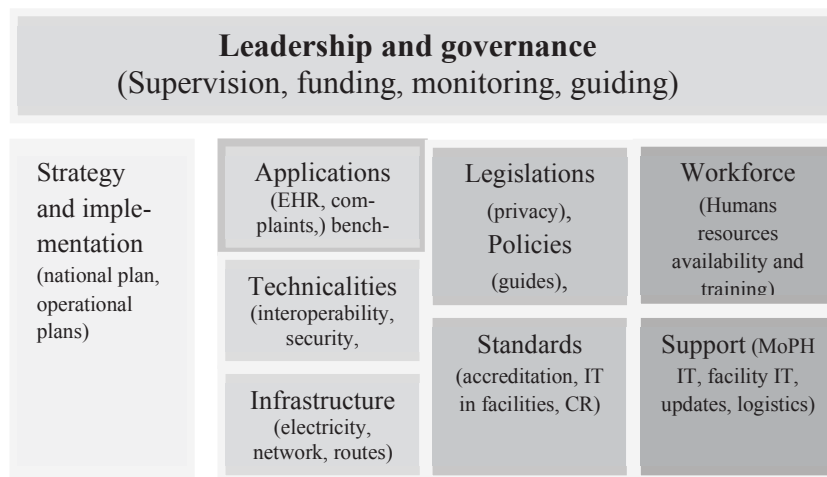
The first group is governmental stakeholders and external entities like the managements in the concerned ministries (MoPH, MoI, MoJ, MoT, Labor, internal affairs), local authorities and offices of MoPH, medical and paramedical syndicates (doctors, hospitals, nurses, midwives...), national and international non-governmental organizations (NGOs), in addition to the public (patients and relatives whether Lebanese, refugees or foreigners).

The second group is the guarantors who provide medical coverage for citizens. These guarantors are: the National Social Security Fund (NSSF), the civil servants cooperative, military schemes, private insurance, MoPh coverage.

The third group consists of the medical institutes that provide the health services to the population (private hospitals, public or governmental hospitals, primary healthcare centers, pathology laboratories, diagnostic

centers, clinics, pharmacies), which are the main element of implementation of the solution. Their human resources are the main component of entering data into the national unified health information database.

In order to implement this model, all stakeholders will contribute to its success, at all levels. MoPH will be the authority that supervises the implementation, and communicates with different stakeholders and managements to facilitate the process. In doing this, MoPH has the different levels of supervision, action and monitoring. This strategy distributes the work into many sub-processes in order to build an effective e-health framework as shown in the figure 1 below.



Note – Prepared by researcher

Figure 1 – E-health components for national project managed by MoPH

The core of the organizational model is the creation of national integrated database for management of the healthcare sector in Lebanon in a holistic and centralized approach. This centralized database will receive data and queries on multi-level basis. Different levels of users distributed by authority, expertise, job type, and process ownership will have different levels of access and privileges. This multi-level system will allow programming of multiple modules that can be distributed according to user credentials. Modules related to billing, management, quality, patients, doctors, nurses, technicians, IT experts, guarantors, citizens, MoPH and many others will be different in design, and addressed only to the correct stakeholder.

This database will hold all the health data of the Lebanese citizens and those who get hospitalized in Lebanese healthcare institutes, in both the private and public sectors. This will include the citizens' and patients' experiences with the supporting and diagnostic services available (clinics, laboratories, radiology, pharmacies and others). This health information will be saved in the form of electronic health records (EHRs) in the dedicated data center at the ministry of public health. These records will have a unique

citizen/patient identifier so that each one will have one and only one health file that contains his history. In addition to EHRs, the database will hold all relevant statistical data and indicators that will be submitted by health institutes, for use in planning, resource allocation, campaigns, and benchmarking among peers and other services. The database will also allow determine the eligibility of citizens to receive the hospitalization services requested, and the approval decision electronically. Also information about vacancies, services, doctors, quotas, budgets, expenses and revenues will be stored in this database, in addition to monitoring and control functions that will allow MoPH and health institute owners' better management and supervision. The national database will provide complete health data as electronic health records (EHRs) which is the largest step into creating the necessary background for better management of the sector. Lists of doctors and specialties, clinics, bed vacancies and services, and health centers are also available with real time data about availability, opening and closure, in addition to costs of services provided to patients. Related to the unique identifier, each citizen's EHR will contain the following sections: *Demographics, Contact information, Health history, Electronic medical records, and guarantor information.*

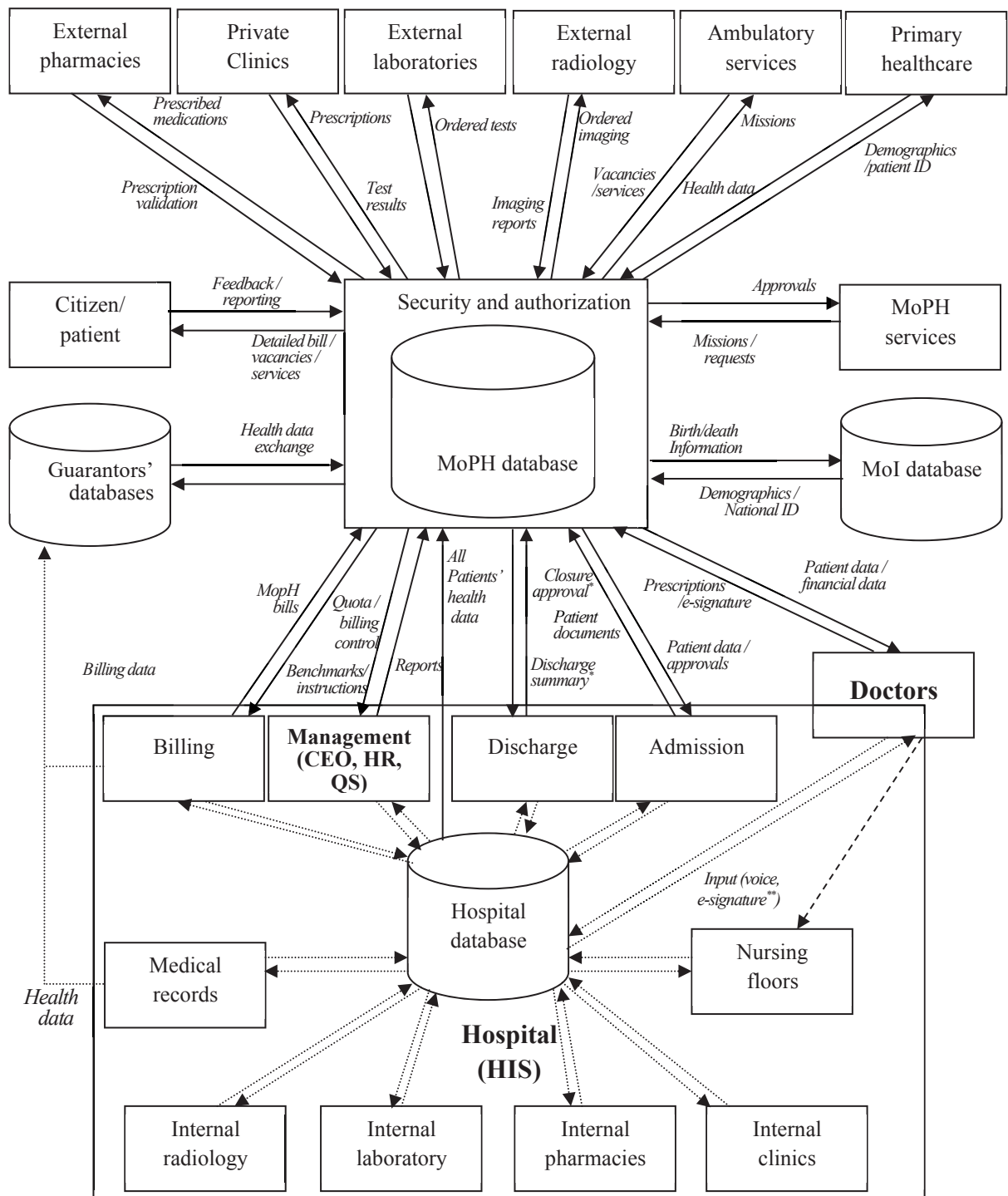
The unified database determines the roles of *participants and stakeholders* in the following expected manner: *Hospitals and other long stay institutes, Doctors, Primary healthcare centers and other one day procedures, Guarantors, MoPH services, and all related stakeholders*

This model summarizes the data interaction among all stakeholders without interfering with the smoothness of operations inside each unit, yet at the same time providing all health data and supporting data from its sources.

This is evident in the schematic diagram of the formation and functioning of a unified health information database at MoPH, reflecting the interaction between all participants in medical care and other stakeholders (Fig. 2). Thus, the national unified medical database will ensure the integration, storage, use of medical data, as well as the exchange of information of all stakeholders and direct control of MoPH over medical and financial procedures.

The functioning of this database is based on the use of an EHR, which will contain all historical and current information about his health, providing unique identification of the individual and providing stakeholders with differentiated digital access to medical information, maintaining its confidentiality, but allowing specialists to receive access to vital authorized information for the provision of medical care.

Figure above reflected the exchange of information both within medical institutions and with external organizations, as well as the passage of information through a single data processing center for storage and monitoring.



Dotted lines are operations done external to the proposed system.
 * Operations specific for MoPH patients only.
 ** Is an internal operation but needs to be automated within each hospital.

Figure 2 – Schematic diagram of the formation and functioning of a national unified health information database under the MoPH

The *roadmap for construction* will need the collaboration of the efforts of all stakeholders, there should be a multilevel plan for this implementation which specifies the role of each stakeholder, the funding resources,

monitoring of implementation, testing, training, until the final deployment. Such roadmap is summarized in the steps: Stage 1. Performing a gap analysis. Stage 2. Considering the different options for financing this solution. Stage 3. Achieving the technological readiness of the data center of MoPH. Stage 4. Assessing and achieving the technological readiness at the institutes of the stakeholders and the ways to link. Stage 5. Defining the mechanism of data transfer from hospitals and health centers and related institutes. Stage 6. Determining the unique citizen/patient identifier mechanism. Stage 7. Legislations. Stage 8. Unifying the EHR components by creating a template for the required sections. Stage 9. Gathering the citizen/patient data from guarantors. Stage 10. Designing the database at MoPH data center that will hold all health information. Stage 11. Studying the security. Stage 12. Creating a portal for every type of stakeholder. Stage 13. Training of trainers (IT managers). Stage 14. Training of stakeholder representatives. Stage 15. Testing the availability and use of solution. Stage 16. An implementation period for one year [3]. The forecasted creation period till the implementation start will take a maximum period of 3 years, from the time that MoPH decides to initiate, if all steps are initiated from ground level according to researcher's estimation, based on expert opinions, Lebanon's circumstances, and stakeholders' commitment.

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